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ABSTRACT

It has been argued that higher education in Ontario should be lengthened from a 7-month academic year to a 9-month academic year that costly facilities might be more fully utilized and that students might complete degree requirements in 3 years instead of 4. This brief is organized into 6 sections consisting of (1) a brief discussion of the issues and scope of further studies, (2) and (3) summaries of perceived advantaged, disadvantages and characteristics of calendar alternatives in American and Australian experiences, (4) an analysis of the existing year-round utilization of Ontario universities, (5) specific comments on the Guelph trimester operation and some models analyzed by the University of Manitoba, and (6) some model analyses of the 3 most common alternatives of semester, trimester and quarter systems. It is felt that for a year-round academic year to be fully successful, the public's attitude (that fall, winter and spring are mainly for work and study, and incidentally for leisure, while summer is the reverse) must change. (Author/HS)

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Council of Ontario Universities
Conseil des Universités de l'Ontario

A COMPARATIVE ANALYSIS OF UNIVERSITY CALENDAR SYSTEMS

Brief to the

Ontario Committee on University Affairs

October 4, 1971

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SECTION 1

ISSUES AND A PROPOSAL FOR FURTHER STUDY

Year-round operation has been raised recently as a specific issue in the Ontario university context. As Hugh McIntyre reports in the following appended article reprinted from the March-April 1971 issue of Canadian University and College, the Honourable William Davis "...can't see any other reason for the current academic year other than its being traditional". McIntyre goes on to point out that Premier Davis had suggested earlier to provincial university presidents that the academic year could be lengthened from seven months to nine months thereby allowing students to complete a four-year honours degree in three years.

The Carnegie Commission on Higher Education, in their publication Less Time, More Options, recently called for, among other things, reducing the time to get a BA by one year and suggested this could be done by accrediting high schools to give the equivalent of the first year. The practice of giving advanced standing in American colleges, thus shortening the time in university, is even now fairly substantial.

A few months ago Liberal Leader Robert Nixon, in a speech at a nomination meeting at South River, said his government would insist that universities and colleges adopt the three-term system because "we can no longer afford to have costly buildings standing idle about one third of the time".

It is only fair to say that the issue is neither solely political nor of recent vintage. No doubt achievement of economies was at least one desired outcome of the University of Chicago's shift to the quarter system in 1892. Generally the economies hoped for have been much more elusive than those predicted by theoretical models.

We are attempting in this brief not to pre-judge the outcomes of further studies, which we will propose later, but rather to present a balanced view of what has gone before and what seem to us to be the main issues. The brief is organized into six sections consisting of (1) a brief discussion of the issues and scope of further studies, (2) and (3) summaries of perceived advantages, disadvantages and characteristics of calendar alternatives in American and Australian experiences, (4) an analysis of the existing year-round utilization of Ontario universities, (5) specific comments on the Guelph trimester operation and some models analyzed by the University of Manitoba, and (6) some model analyses of the three most common alternatives of semester, trimester and quarter systems.

The requests for improved "throughput" and better utilization are attractive on the surface and understandably have some appeal at this time to beleaguered taxpayers. Politicians are quick to note this in public statements. But it is wrong to assume that pushing students through faster and out into the chronically troubled labour market earlier is necessarily cost-beneficial to society. As Dr. Winegard points out in his letter in Section 5 we need a true social accounting to be able to assess the effects of this. Also, most higher educators have a gestalt view of

university education; it is the sum of the students' experiences in lectures and seminars, in libraries, study, research and reflection, in consultation with professors and other students, in off-term visits and necessary pursuits of leisure time activities that produces a university education which, possessed by a substantial minority, is of net benefit to society. Benefits are contributed by educated people all through their lives. Internal productivity measures do not provide the necessary answers! It is just as wrong to assume that the value of a university education is measured by increased student usage of university facilities as it is that the value contributed to society by our legislators is measured by attendance in the legislature (see Morton Shulman's letter to the Editor of the Toronto Star, August 10, 1971).

The term year-round is most often used to connote enrolment of full-time students throughout the year. In fact, all universities are in some measure year-round if their part-time enrolments, continuing education and casual bookings are properly taken into account. One of the important trade-offs may be that as the full-time student use of university facilities increases, the availability of these facilities for people who can only participate in part-time programmes decreases. Availability of facilities for casual bookings (a community service) and rentals will also decline. Section 4 of this paper displays a rather substantial use of facilities in the more proper use of the term year-round. This ought not to be forgotten in future studies or in the decision-making which might lead to changes in the present system.

The overriding issue is concerned with trading off benefits and costs. Very simply, a better utilization of facilities (benefit) will entail some additional expense (cost). If a proposed alternative system is cost-beneficial in comparison to the existing system, then, in theory at least, movement should be made toward the adoption of the more cost-beneficial alternative. Models have been proposed and adopted in the past with firm convictions that they would be cost-beneficial alternatives. Why then is the success rate so low? Why were the moves to trimester operations at the University of Pittsburgh and the Florida State universities so disastrous? The answers, in economic terms, are provided at least in part by the analyses by the University of Manitoba (Section 5) and by Mr. DaSilva (Section 6). But these are only reflections of the application of resources which have their effects in the increased costs. The real answers lie behind the extensive lists of advantages and disadvantages in Section 2, that is, in the attitudes of the university communities and society (tradition in Mr. Davis' words) toward the change. In order for the move to be cost-beneficial professors must be agreeable to the change without insisting upon equivalent additional pay for additional work (there should be some marginal returns), students must attend the third term, if this is the pattern, in substantial proportions and accept that the full range of offerings cannot be made if the proportion is not substantial, and society must change prevailing attitudes that fall, winter and spring are mainly for work and study and incidentally for leisure while summer is the reverse.

It is obvious then that administrators cannot by themselves cause their universities to move quickly to changed patterns. The university community and society must be willing to accept such changes. Professors must join with administrators in supporting the new pattern, whatever it may be. Parents and students must view the alternatives of shorter total time spans with longer academic years and a university year without the summer off as desirable alternatives.

We must emphasize, in the strongest terms possible, that we have not included the very considerable impacts on quality and curriculum in our analyses; nor have we dealt adequately with all of the costs and benefits including on the cost side, effects on student aid, increased plant depreciation, problems of absorption into the labour force and on the benefit side, increases in lifetime earnings and reduced needs for plant additions. In that sense the models are sub-optimal.

It must be evident that we have no easy answers at this time. But we do believe that there is now sufficient evidence on the costs of year-round operation to merit further examination in the Ontario context especially as these costs relate to academic values and curriculum content. There may indeed be changes in the attitudes of the public, students, academic staff and administrators toward alternating off-term periods among three or four terms. The traditional barriers of shortages of properly prepared academic staff and course scheduling difficulties appear to be giving way to some extent. Perhaps we should not write off the trimester plan just because Florida and Pittsburgh could not maintain viability with it. It is just possible that a proper measure of financial incentives to students and staff combined with the changing attitudes of society toward work, study and leisure could act together to get viable enrolments in the third term. Further, while we do not in this paper present any analysis of the specific alternative addressed by Premier Davis, (the compression of four-year programmes into three by extending the length of the academic year) we have begun to develop analytic models and simulations of this alternative which is, of course, quite different from the year-round pattern of trimester or quarter systems.

We believe the prognosis for some net return coming out of further investigation of the various alternatives is very good and propose, therefore, that our Research and Planning Committee should proceed from this admittedly limited base of information to more thorough quantitative analyses of internal and external costs and benefits and to qualitative analysis of the effects of postulated changes on pedagogy and learning outcomes. The Committee should report to the Council and to the Committee on University Affairs approximately one year from now. The terms of reference for the work of the Committee should be as follows:

1. Examine in greater detail, by research of literature and specific studies where necessary, the costs and benefits of the Guelph, Waterloo, and Simon Fraser systems in Canada.

2. Examine in greater detail the reasons for failure in the applications of the trimester system at Pittsburgh and the Florida State universities.

3. Survey the status and appraise the attitudes of faculty, administrators, and students to the investigations of degree-compression (i.e., compressing four years into three) being contemplated by the Universities of Connecticut, Nebraska and California at Berkeley.

4. Extend the Manitoba/DaSilva models to embrace extra-sectioning and other administrative costs for application to the analysis of alternative systems including Guelph and Simon Fraser.

5. Examine in greater detail the range of offerings and costs of existing part-time credit programmes in provincial universities and the degree of complementarity/conflict with full-time credit and other university programmes.

6. Develop a model for assessing the net long-term social costs and benefits of compressing degree programmes.

7. Make such recommendations for action as are advisable as a result of these studies.

Why year-round operation is so tempting yet so resistible

By HUGH C. McINTYRE

"I CAN'T SEE ANY other reason for the current academic year other than its being traditional". This remark by the Hon. William Davis, Ontario's new Premier, made headlines a few weeks ago when, as Minister of Education and of University Affairs,* he was campaigning for party leadership. He told the press that last fall he had suggested to provincial university presidents that the academic year be lengthened from the present seven months to nine, to allow students to complete a four-year honours degree course in three years.

The government's interest was, clearly, to cut the cost of subsidizing post-secondary education in the province, now running at over $600,000,000 annually and escalating at over ten percent per year. In the simplified arithmetic used in communications between politicians and newsmen, Mr. Davis stated that, as the government spends $3,500 per year per enrolled student, this amount would be saved for each student completing his degree a year earlier. Even if an extra grant of $800 were given to the student to make up for loss of summer employment opportunities, the province would wind up with a $1,000 saving per honours BA.

Spokesmen from universities at Toronto, Guelph, and London, when polled by the press, were elaborately cautious in their response. Retiring U of T President Claude Bissell admitted there was "something to be said" for the idea.

W. C. Winegard of Guelph (already running a summer semester) warned that "it would not be a simple thing". The fact that Mr. Davis had received no direct feedback from the universities after a lapse of several months, indicates well enough the lack of institutional enthusiasm for his idea.

This is not the first time the Ontario Government has urged the benefits of year-round operation on the universities. In 1963, Mr. Davis's predecessor, Mr. Robarts, suggested the idea. This stimulated the Canadian Association of University Teachers to make a study which suggested that, although savings of three or four percent might be possible by the adoption of such a plan, it would be at an unacceptable cost in educational quality.

Spirited defence

A complete session of the National Conference of Canadian Universities and Colleges (now Association of Universities and Colleges of Canada) was devoted to the topic in 1964 in Ottawa. In spite of a spirited defence of the trimester co-operative engineering plan at the University of Waterloo by Dr. D. T. Wright (then dean of engineering there), the balance of university opinion expressed at that time was hostile to any lengthening of the academic year.

The proceedings reflected current developments in the U.S.A., where there was a strong push for year-round operation. The surge began in 1959 with the introduction of a trimester system at the University of Pittsburgh. Proponents like Vice-Chancellor E. Montgomery who addressed the Canadian meeting, gave a hard-sell pitch for the idea to anyone who would listen, stressing its academic as well as its economic advantages. In 1965, however, to the apoplexy of state legislators, the institution was found to be $20 million in debt and unable to meet staff payrolls — the result of persistently low registrations for the summer semester.

But in the U.S. in the early Sixties, Pittsburgh was to be emulated. The Florida State Legislature in 1962 decreed that all state post-secondary institutions must switch over to year-round operation within twelve months. (This produced some interesting innovations in institutional schedules, though it was never fully implemented.) The University of California at Berkeley switched to a year-round system of quarters in 1965 (co-incidental with the onset of continuing student unrest which has made its name a by-word on this continent).

In the same year, two new Canadian universities, Guelph in Ontario, and Simon Fraser in British Columbia, both of which had special relationships with their provincial authorities, went into operation on a trimester system. Although both have maintained this system, which divides the year into three four-month terms, with students able to enter or graduate in any one term, neither have claimed that they have saved money by so doing. For, while at first blush it might appear that the trimester system allows graduation of fifty percent more students at no greater cost, this assumes that all buildings are used to full capacity at all times, and that professors will teach for twelve months for the same salary as for eight months. Neither of these assumptions is valid.

The accepted criteria for year-round operation include the following:

— A beginning student can enter at the start of any semester or quarter.

— A full enough roster of courses must be given in each term so that all students can make a full term's progress in their programmes.

— Students can continue for any number of consecutive terms, or drop out for one or more terms. At the same time, planning must be made for full utilization of university staff and facilities for all terms.

— Faculty must have a rotating system of leaves which allows them at least one term per year for study, travel and research.

Although many institutions (some

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Mr. McIntyre was associate secretary of the Commission on Post-Secondary Education in Ontario from September 1969 until February 1971. A former editor of CANADIAN UNIVERSITY & COLLEGE, he is now a member of the editorial staff of The Financial Post in Toronto.

*Mr. Davis was elected leader of the Ontario Progressive Conservative Party in February. One of his first acts after being sworn in as provincial Premier was to separate the two responsibilities that he had held in the previous cabinet, and to appoint John White as Minister of University Affairs, and Robert Welch as Minister of Education.

Year-round operation

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55 in the U.S.) have trimester systems, few claim to conform to such criteria for year-round operation. At Guelph, for instance, full-time enrolment in the summer semester was only 2,586, compared to its 6,500 winter enrolment. This summer undercapacity, inescapable unless attendance is compulsory, has dogged every scheme for year-round operation, and prevented realization of planned economies.

It is not the only hidden cost, however. A recent unpublished study by the "Committee on the Academic Year" at the University of Manitoba shows how savings from increased plant utilization must be balanced, even in a fairly large (enrolment 13,000) institution, against more frequent offering of courses.

Manitoba's calculations

Calendar system	*Two-term*	*Balanced trimester*	*Four-quarter*	*Waterloo system No. 4*
Equivalent cost per student per year	$1,450	$1,050	$1,290	$1,330
Cost for 13,000 students ($ millions)	18.8	13.6	16.8	17.3
Estimated savings of year-round operation without cost of additional sectioning	....	+5.2	+2.0	+1.5
Estimated cost of extra sectioning ($ millions)*	....	15.0	7.5	7.5
Assume extra cost of sectioning can be reduced 50% ($ millions) ..	....	7.5	3.7	3.7
Net saving based on 50% improvement ($ millions)	....	—2.3	—1.7	—2.2

All projections made on basis of most effective staffing system. Source: *Report on Year-Round Systems*, Committee on the Academic Year, University of Manitoba. *Extra sectioning cost estimated as $15,000,000 for three-stream calendar systems; $7,500,000 for two-stream calendar system.

Savings become losses

The table on this page indicates what would happen if even fifty percent of courses presently given at the university had to be sectioned so that they were offered three times (or, in a quarterly system, twice) annually. This cost is additional to that required to pay extra staff during the one-term-per-year vacations of the regular faculty. Savings from better building utilization, which range, depending on the schedule projected, from $1,500,000 to $5,200,000 annually, would become losses, compared to the present system, of from $1,700,000 to $2,300,000. The Report concludes, on this basis, "no reduction in costs can be achieved by the introduction of year-round operation at Manitoba."

It is interesting to compare this report with an earlier one from the same institution, prepared by H. D. B. Wilson in 1962, and reported to the 1964 Ottawa meeting referred to earlier. In that document, the recommendation was for an eleven-month year with three terms, but only one admission and graduation date. The staff, but not the students, would have one term off per year, and the time requirement for a pass degree would be cut to two years, and an honours degree to three years. The author noted hopefully that having a one-month university vacation period in July would eliminate the need for air-conditioning — although this may have been a snide reflection on Manitoba's summer climate.

Such a prolonged year, if the students could stand it economically and mentally, would certainly solve the problem of poor summer attendance. It may well have been such a scheme as this that Mr. Davis proposed for Ontario, although it was admitted that by expanding the year by only two months, pass degrees would still take three years.

A quite different, and more flexible plan, familiarly known as the "Tsetse" has been proposed by McGill's Academic Policy Committee. The Two Semester — Two Summer School (TSTS) schedule calls for two thirteen-week winter semesters, and two summer schools of seven weeks each. The advantage of this system is that the institution of the first full-credit summer school in July and August is similar to many existing schools run by universities, primarily for teachers, and therefore has a prepared clientele to make up for smaller full-time undergraduate participation. The second summer school in May and June, it is suggested, would not be set up until there was a clearly demonstrated demand for it on the part of undergraduates.

So far in Canada, only Waterloo University, in its co-operative engineering programme, seems to have made a success of year-round operation. But, unlike the year-extension and semester systems discussed so far, the Waterloo system is a deceleration rather than an acceleration of the higher education process. New students are admitted only once a year, and split into two streams, one attending classes for a four-month semester while the other is employed by industry in supervised work relating to the students' academic specialties. Such a plan, demanding the closest co-ordination between industry and university, might work well with engineering, but how could it be applied in arts and pure science, where even graduates are presently having difficulty finding employment?

Move by business

Nevertheless, there appears to be a move on the part of business to discuss the possibility of such co-ordination. Last fall, the Canadian Chamber of Commerce discussed at its annual meeting a joint report from its Youth Committee, headed by the president of Bell Telephone, R. C. Scrivener, and its Education Committee, headed by Donald Cornish, president of Anaconda American. They would like to see a two- or three-term academic year in which students would alternate study and work sessions, not just in engineering, but in other fields. Students, they feel, would welcome the idea, both in alleviating the annual summer employment crisis and in giving more "relevance" to the students' employment experience.

But, it is clear that, in spite of business and government pressure, many sweeping changes would be required in departmental structure, central administration, and student faculty thinking before the Canadian university becomes a year-round enterprise completely interlinked with the economic and manpower requirements of government and business. In fact, to many present members of humanities faculties, the enterprise would not be a university at all. □

SECTION 2

ADVANTAGES, DISADVANTAGES AND CHARACTERISTICS OF CALENDAR ALTERNATIVES - THE AMERICAN EXPERIENCE

(Extracted from Year-Round Operation, Preliminary Working Paper by D. Ross, 1969)

Advantages of Year-Round Operation

In addition to providing educational opportunities for greater numbers of students, increased efficiency of operation and the educational gains outlined by Chancellor Litchfield, a number of other major advantages are also attributed to the year-round calendar. Some authors state that:

1. Year-round operation should make it possible for an increasing number of students to accelerate their progress toward graduation. Some undergraduate students should be able to complete the normal four-year program in three years. Graduate students, especially those who are employed by the university, should be able to complete their programs more quickly.

2. Students who have fallen behind the normal schedule because of economic difficulties, family problems, illness, the failure of courses, and other disrupting factors, should be able to regain lost time and graduate on schedule.

3. Students should be able to enter and graduate at regular intervals throughout the year. This could result in a better distribution of those entering employment as compared to the present concentration of available graduates in June.

4. Year-round operation should provide for fuller utilization of teaching personnel, which in many fields is in short supply and likely to continue so for the next decade. It would also provide additional employment and compensation for faculty.

5. Year-round operation should provide more flexible opportunites for leaves, study, travel, or teaching elsewhere. Those who desire time off at periods other than the summer could plan their schedules accordingly.[1]

6. Year-round operation produces more constant effort on the part of students and average academic results in the university improve. The Pennsylvania State University reported, for example, that in the first year following the adoption of an academic calendar of four terms of ten weeks each, the number of students dropped for poor scholarship declined from 654 to 327. "In addition only 93 students earned a top grade average of 4.00 during the 1960 fall semester, while 218 achieved that record during the first fall term of the new calendar." 2

1. Points 1 to 5 are based upon A.K. King et al., Report of the All-University Calendar Committee, University of North Carolina, 1966.

2. Richard Renner, "Revising the Calendar to meet the Crush," Liberal Education Vol. 49 (May, 1963), 198-203.

7. Life is no longer tied to the seasonal agricultural cycle, while central heating and air conditioning enable studies to be carried on under comfortable conditions at all times. Regions characterized by favourable climatic conditions are available for recreation or visiting at any time of the year. Employment opportunites for both students and faculty are likewise available throughout the year. Time away from the university and from the educational process is still desirable, but this need not be during the summer months.

8. As the number of qualified applicants rises rapidly and education takes a growing share of government revenue the ability of public universities to secure adequate public approval and appropriation will be strongly dependent on whether or not they are using their resources to the maximum degree possible consistent with high educational standards.

9. The separately inspired directed and oriented summer session is in many ways justified more by history than by logic. From an educational standpoint, much can be said favouring the integration of the summer session offerings into the university operation. By gearing the university's operations during the summer into the regular program, it should be possible to make available a wider selection of courses better designed to further academic goals than is possible in a separately conceived summer session. 1

Disadvantages of Year-Round Operation: The Case for the Status Quo:

1. The present system may not be perfect but it works. Adoption of year-round operation is a major change certain to result in serious dislocations.

   a) Many if not all courses would have to be redeveloped.

   b) The inter-relationship between courses, within programs, within schools and colleges, and between schools and colleges would have to be worked out all over again.

   c) Any condensation of courses many diminish their effectiveness since students would have less time to assimilate materials.

   d) Some extra-curricular features of the university might be adversely affected. 2

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1. Points 7 to 9 are taken from W. Haber et al, Commission on Year-Round Integrated Operation, (Ann Arbor: The University of Michigan, 1961) pp. 8-14.

2. W. Haber et al, op.cit. p. 5

2. There is a temptation under the pressure of year-round operation to lose sight of the educational purposes of a schedule. This could lead to reducing the time available for student advising, classroom and laboratory teaching, reading, the writing of papers and examinations. In consequence the quality of the educational experience would be diminished.

3. Both faculty and students may become fatigued in a year-round program. Students may attend and faculty may teach too many consecutive terms. Faculty members may also have to take on more administrative burdens.

4. The year-round operation of an institution may result in the understaffing of administrative offices and library services, for the mechanics of registration and grading will become more frequent and more complicated.

5. The year-round operation of an institution makes the problem of maintaining the physical plant more difficult. 1

6. Students need periods of time away from studies for rest, reflection, and intellectual maturation.

7. Faculty need considerable periods of free time each year to do research, read in their fields of interest, prepare new courses, bring old ones up to date and so on. A year-round system might cut into activities if a large financial inducement was provided for additional teaching. Universities might provide this incentive if there is difficulty in finding men to handle specific courses in the additional session.

8. Year-round operation breaks up the division of students by years. Some writers suggest the consequence is to increase the students' feeling of loneliness, anonymity and insecurity within the university. 2

9. Under a year-round system some faculty must agree to take their vacations at other times than during the summer. Staff members with children may be unwilling to do so.

10. If faculty members' attendance on the campus varies, this complicates committee work, student advising and supervision of graduate students.

11. Large numbers of students are unwilling to attend university during the summer. Few will wish to accelerate and many will not agree to take either the fall or winter terms off.

12. Funds may not be available to permit students to attend year-round while if they were, many students are loathe to go into debt and will not accept loans.

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1. Point 2 to 5 based upon A.K. King et al. op. cit., pp. 13-14

2. Points 6 to 8 are based upon B. Jackson et al. op. cit., pp. 17-21.

DEFINITION

The past ten years of investigation of "year-round operation" has not resulted in widespread agreement on a single definition of the term itself. As a result there is neither full accord on the number of schools operating year-round nor about the specific types of calendars schedules which fall within the general classification.

A minimum and relatively general definition of year-round operation is:

> "an academic calendar which provides for forty or more (usually more) weeks of classes per year and which permits the student who desires to do so to earn the baccalaureate degree in three rather than the usual four calendar years without requiring him to carry more than a normal full-time course load." [1]

But some authors contend that a year-round institution must do more than provide students with the opportunity to earn a baccalaureate degree in three years. Advocates of a stricter interpretation declare that a year-round calendar must:

> (1) permit a student to enter the institution at the beginning of any term, pursue a normal program of studies on the usual sequence without encountering undue scheduling difficulties, and, if he wishes to do so, earn his baccalaureate degree in three calendar years without requiring him to carry more than a normal course load;
> (2) encourage and stimulate summer enrolment by both new and former students and;
> (3) follow practices and policies which are calculated to move the institution rapidly in the direction of approximate equalization of enrolment in all periods. [2]

A definition of the optimum conditions for operating a year-round academic calendar is stronger still:

> The ideal year-round operation is characterized by terms of equal length, equal character, equal status, equal admissions, equal enrolments and equal pay-per-term for members of the faculty and staff. [3]

No university has succeeded in meeting all these requirements.

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1. W.H. Stickler, "The College Calendar: What Kind of School Year?" pp. 232-233
2. W.H. Stickler & M.W. Carothers. The Year-Round Calendar in Operation: Status, Trends and Problems (SRED Research Monograph No.7) Tallahassee:
3. Ibid., p.6.

For the purpose of this paper a university operates year-round when it employs an academic calendar providing for a minimum of forty weeks of instruction per year. The administration of the summer term must be integrated with the others. A large number of regular course offerings must be made available during the summer and must attract substantial numbers of regular full-time students of the university, as well as a part-time clientele such as teachers. In short, the summer months must be used, not just for any valid educational purpose, but for the same purpose as now occupies the regular academic year, i.e. for the instruction of regularly matriculating degree-seeking students.

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1. D. McEntire, "Academic Year: Nine Months or Twelve?" A.A.U.P. Bulletin, 49: 360-3 December 1963.

Summary of Calendar Alternatives [1]

The various calendar alternatives may be divided into five general groups: I. Quarter system: II. Trimester plan: III. Semester system: IV. Split third-term plan: V. Year system. The patterns typical of these plans, in terms of number of weeks of instruction (classes and examinations) per term, are detailed in Table I. Briefly, the five principal systems can be characterized as follows:

I. Quarter System: This program consists of four periods of 11 weeks each (classes and examinations) separated by Christmas, Spring, June, and Labour Day recesses. It fits the natural calendar and the seasons well but involves one additional registration and examination period compared to the semester or trimester plans. Ten weeks of classes and one week for examinations are typical in most institutions. While widely used, it is not as popular as the semester plan. At present, the summer quarter is usually shorter than the other terms and may be split into two sessions to accommodate summer school clientele.

II. Trimester System: Semesters are shortened from the conventional $16\frac{1}{2}$ weeks under the regular semester system (15 weeks of classes and $1\frac{1}{2}$ weeks of examinations) to 15 weeks (classes and examinations) This permits scheduling one semester between Labour Day and Christmas, a second semester from early January to late April, and a third semester from early May to late August. The summer session may be the third semester or may remain separate and be run concurrently with the latter part of the third term.

III. Semester Plan with Integrated and expended Summer Session: This arrangement preserves two conventional semesters but replaces the summer session with a 12-week summer term integrated administratively with the academic year.

Basically it is two semesters and one quarter. The summer term may be split in two so that students may elect courses for the entire 12 weeks or for either 6-week period.

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1. This section is largely based upon a similar summary in W. Haber et.al., Commission on Year-Round Integrated Operation, The University of Michigan, 1961.

Length of term refers to period from first day of classes through last day of examinations but excluding orientation and registration.

IV. Split third-term plan: This calendar embodies features of both the trimester plans and the expanded summer session. Basically it is a trimester plan, but with the third or spring-summer semester divided into two $7\frac{1}{2}$ week divisions. The three semesters are split by recesses at Christmas, late April or early May and Labour Day. After the close of the second term students could: (a) take 4 months off; (b) take $7\frac{1}{2}$ weeks (one half semester) extra and still have 10 weeks vacation in July and August; (c) take a full third semester with a 2-week vacation both before and after; or (d) take 10 weeks off and return for a second 8 weeks of study in July and August. The old summer session is incorporated and integrated into the second half of this term rather than being independent and concurrent.

V. Year System: The year system is based on ore enrolment for the academic year with the year as the normal unit of examination. Courses are offered from September to April and therefore cannot be repeated during the same regular academic session. The regular academic period is approximately 32 weeks in length. Most Canadian universities employ this system, along with the summer session of six weeks designed primarily for non-full-time students.

TABLE I

CALENDAR ALTERNATIVES

Plan	Pattern	Total Weeks
I. QUARTER SYSTEMS	11-11-11-X	
A. Standard	11-11-11-8	41
B. Full summer term	11-11-11-11	44
C. Penn State plan	10-10-10-10	40
D. Split summer term	11-11-11-5-5	43
II. TRIMESTER PLAN	15-15-15	45
III. SEMESTER SYSTEMS	16-16-X	
A. Standard	$16\frac{1}{2}$-$16\frac{1}{2}$-8	41
B. Extended summer term	16-16-12 (6-6)	44
IV. SPLIT THIRD TERM	15-15-15 ($7\frac{1}{2}$-$7\frac{1}{2}$)	45
V. YEAR SYSTEM	14-18-6	38

Quarter System

The quarter system, as we know it today, originated at the University of Chicago in 1892 with the introduction of a summer term to fill out the year, together with the three traditional terms of the English university. It is currently in use at Chicago, Northwestern, Michigan State, the California Institute of Technology, Ohio State, Minnesota, Stanford, Iowa State, North Carolina State, Oregon State, Oregon and Washington, among the major "complex" universities. In most of these institutions, the summer term is treated as a separate entity from the others. It's length is usually shorter, split sessions may be offered, and the student body is composed predominantly of temporary rather than regular students. The faculty is hired separately and the course and service offerings differ in may respects. Many reasons have been advanced for or against the quarter system, but the following appear to carry the most weight.

Advantages:

1. It is better adjusted to national holidays and to the normal breaks in the work year. Quarters fit naturally into the periods between Labour Day, Christmas and spring vacation.
2. The quarter system permits students to take fewer courses in a given term and yet take the same number of courses in a college career.
3. A full quarter summer session, equal in most respects to the three quarters constituting the academic year, may be introduced, thus permitting efficient use of the plant and also acceleration for students who wish to complete a degree in three calendar years.
4. The quarter system meshes well with the public school calendar both in September and June, as compared with the trimester plan which fits with the public school calendar in September only.
5. Any one of the four quarters may be used as time off for faculty or academic appointment. Institutions on the quarter system may pay salaries on a 12-month basis for any three quarters of teaching.

Disadvantages:

1. The quarter system involves one more registration period and one more examination period during the academic year than the semester or trimester systems.
2. The practice of a six or eight-week summer session for teachers and other off-campus students is so well established and so important that a full summer quarter is impractical for schools having a well-developed summer session. If the summer quarter is split into two 6-week sessions, the quarter

plan then consists of five separate terms or six, if courses are offered throughout the 12-week summer session as well as during each half separately. Thus, one more term is introduced in any case without any compensating advantages.

3. The quarter system offers less flexibility in adjusting for unavoidable absence from class of either faculty or students. It is an exceptionally tight program of only ten weeks. A day or a week lost by anyone is 50 per cent more important than a similar period lost during a semester.

4. The tight nature of the quarter system program tends to increase feelings of haste and pressure. Term papers must be handed in sooner after being assigned than under semester or year system. Faculty must mark more tests and more essays between September and May since there is one extra term for which marks are needed.

Trimester System:

The "trimester" plan came into use in the United States during World War II in connection with the Navy College Training Program. It consisted of essentially year-round operation with three trimesters of 16 weeks each, the terms opening in early July, November and March. Final examinations were compressed into shorter than normal periods. Few holidays were observed, and about ten days recess divided semesters. Residual reaction to this experience has been uniformly unfavourable, the feeling being that cumulative fatigue quickly became a serious problem for both students and teachers. After 1945 universities converted back to pre-war schedules.

In 1959 the University of Pittsburgh initiated a trimester program characterized by a 15-week semester between Labour Day and Christmas, a second term from January to the middle of April, and a third term running from the end of April to early August. This left a 4-week vacation and housekeeping period in August for all faculty and students. In the Pittsburgh plan, the terms were limited to 15 weeks and for the first year no provision was made for examinations within this period. Subsequent changes involved the re-establishment of a final week in which two-hour blocks were available for final examinations or other purposes at the discretion of the instructors. A one-week break was instituted between the second and third terms.

During the third term an effort is made to provide a good selection of courses to enable students to make normal progress toward their degrees. A complete program of student services and activities is maintained in the third as well as in the first two terms. In 1961, a separate summer session was re-introduced after a lapse of one year to provide for the educational needs of teachers on summer vacation.

Advantages:

1. The trimester system offers longer terms than the quarter system calendar providing more time in which essays and other work may be completed.
2. A trimester calendar contains one less examination and registration period than the quarter system.
3. A trimester program contains a summer term equal in most respects to the other semesters in the academic year, permitting students to accelerate or make up courses and providing for a more efficient use of the university plant.
4. Staff may take off any one of three terms, or may teach for four consecutive terms and then have eight months holiday with full pay.

Disadvantages:

1. The trimester calendar only articulates with the public schools in September.
2. A fifteen week summer term is too long for teachers to be able to attend.
3. The following conclusions were expressed by a Study Committee on Trimester Operation at the University of Pittsburgh in 1966.
   a) "Students tend to dislike the third trimester unless it is fully equal to the other two in richness of course offerings and in opportunity to obtain credits.
   b) Faculty tend to dislike the trimester if they receive less pay for teaching during the third trimester, do not get an equal share in the burdens and benefits of third trimester teaching, and are not told well in advance of their third term teaching commitments.
   c) Chairmen and other administrators tend to dislike the trimester system if adequate information about enrolment and adequate financing is not available to allow them to plan courses and appointments in good time.
   d) Probably the three most frequent complaints about the trimester system from the academic point of view are that courses are too short, that there is not enough reading time, and that there are too many examinations." [1]

The same report noted that the majority (55.7 per cent) of faculty operating under the trimester system at Pittsburgh felt that the system's advantages outweighed its disadvantages[2] while both graduate and undergraduate students definitely favoured trimester operation.[3]

Semester System:

Academic instruction in terms 15 to 16 weeks in length is characteristic of American education. The term semester apparently originated at the University of Michigan in 1856 and has since been applied to the two-term year which is characteristic of virtually all eastern schools and the great majority of other large universities in the United States.

In contrast to the quarter system, one less registration and one less examination period are required, whether for an academic year or for year-round operation. The length of the semester varies widely. However, most semesters, include from 14 to 16 weeks of classroom instruction exclusive of examinations. American practice in examination scheduling varies widely, but most universities schedule from 6 to 9 days of tests.

A common characteristic of the semester system is its association with an independently finance and directed summer session 6 to 8 weeks in length.

Semester: Standard with Expanded Summer Session:

The least complicated method for converting a university semester system to year-round operation is to expand the existing summer session and to integrate its administration with that of the regular academic year. Day-time summer courses no longer come under the aegis of the Division of Extension, Summer School or its equivalent.

One example is a plan adopted for several years at the University of California. In 1961 the Regents of that university authorized programs maintaining the two-semester calendar. Individual campuses were permitted to offer either a single integrated 12-week summer term of two 6-week summer sessions.

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1. D. Landy et.al., The Trimester System at the University of Pittsburgh, 1966, p.14
2. D. Landy op.cit., p.16
3. Ibid., p.30

The third term was equivalent to a standard quarter being 12-weeks long, or three-quarters the length of the regular semester. The accelerating student could graduate in three calendar years by taking a small overload each semester. The plan has the advantage of making no radical departure from the previous calendar. However, neither half of the summer term extending from about June 10 to August 31 was particularly convenient for public school teachers.

Another example is provided by the University of North Carolina; which, after careful study of the trimester system in 1961, decided to continue with its present two semesters and two 6-week summer sessions ($16\frac{1}{2}$-$16\frac{1}{2}$-12 week pattern). A study committee concluded that the change-over to the trimester plan (15-15-15 week pattern) would be expensive without adding any more days of classes to the calendar year. The members also decided that the two prime purposes of summer sessions, acceleration and making up deficiencies, were better done with more convenience both for students and for the university at 6-week summer sessions rather than in longer periods. Furthermore, they felt that their present system was better suited to the schedule of the public school system in North Carolina, the school teachers in that system, and the system used by junior colleges whose students transfer to the University of North Carolina.

Advantages: For institutions currently on the semester plan with an 8-week summer session, the integrated summer term contains several benefits:

1. No changes need be made in the normal two-semester academic year.
2. By adding 12-weeks of summer session, equivalent to one full quarter of additional classes, four weeks are added to the academic year.
3. Students may elect either 6 weeks or 12 weeks additional schooling over and above the normal academic year.
4. In any approach to full three-semester operation of the university, the California plan may be considered a logical first step which is administratively and financially feasible.

Disadvantages:

1. The plan does not provide year-round operation as does a full four-

quarter or three-semester plan. It is a mixture of two semesters and one quarter with the attendant disadvantages of mixing two major term lengths.

2. The summer sessions differ in length, concept, and treatment from the other two semesters. The difference in atmosphere and feeling between the academic year and the summer session remains.

3. The lame-duck session after Christmas in the standard semester plan is not eliminated. After an anti-climatic two weeks of instruction in January, the change-over from the first to the second semester will continue to occur in late January.

4. Because the Christmas break and the between-semesters break are not concurrent, it is only just possible to schedule a full 12-week summer quarter between the ending of classes in June and Labour Day weekend. In actual practice, it will be necessary to shorten the semester from 16½ to 16 weeks (classes plus examinations) in order to end the second semester in time to schedule two 6-week summer sessions before Labour Day.

5. In such summer sessions neither half is well suited for public school teachers, the first half coming hard upon the closing of school in the spring, and the second half extending up to Labour Day weekend.

Semester: First Semester Completed Before Christmas

If, in addition to adding a full 12-weeks summer session, the two normal semesters are rotated so as to place the between-semesters break at Christmas, several advantages accrue. A plan of this nature has been adopted by the University of Pennsylvania. Its experience and conclusions warrant consideration.

University of Pennsylvania Plan. In 1961 the University of Pennsylvania initiated a calendar which calls for a 15-week semester before Christmas, a 16-week semester after Christmas, and a 12-week summer term, split into two 6-week periods. A third 15-week term could be introduced into the gap between the winter and fall terms at a later date if desirable, turning the program into a trimester system. In arriving at this plan the faculty rejected the alternative of a quarter system and also the necessity of maintaining a separate examination period. The second six weeks of the summer session is essentially simultaneous in time with the former summer session for teachers. During the summer session, courses may be given during the first 6 weeks, during the second 6 weeks, or throughout the entire 12-week period.

The University of Pennsylvania plan has the advantage over the University of California plan in that the lame-duck session of the first

semester is eliminated.

The Split Third-Term Plan:

From the proceeding discussion it is apparent that in several of the semester plans involving a split 12-week summer session it would be possible to lengthen the summer session at the expense of the other two semesters and create a calendar in which the three terms are of equal length, as in the trimester plan, but in which the third term is split so as to integrate within it the current summer session, as in the various semester plans.

In 1961, a study commission at the University of Michigan recommended the adoption of a split third-term (or split-trimester) plan. They suggested that the first term begin on the last Monday in August and that there be $15\frac{1}{2}$ weeks of classes and examinations before a two-week Christmas recess. The second term, beginning in early January and ending early in May, should also provide for $15\frac{1}{2}$ weeks of classes and examinations and contain a full week's break mid-way in the term. The second and third term should be separated by a week of holidays, and the summer semester should be 15 weeks in length, divided into two sessions, of $7\frac{1}{2}$ week sections.

In 1966, a committee evaluated the split trimester and discovered that senior professors at Michigan opposed the calendar by about 60 to 40 per cent, junior faculty members favoured it by approximately the same margin, while 80 per cent of the entire student body preferred it to any other alternative. In 1969 it was recommended that the calendar be altered to ensure that no classes were held before Labour Day.

Advantages:

1. The split-trimester calendar eliminates the lame-duck session after Christmas.
2. The trimester calendar integrates the conventional separate summer program with the rest of the teaching year. Off-campus students, particularly teachers, can conveniently attend the second $7\frac{1}{2}$ week session, while the presence of an increasing number of regular students and the integration of the calendar means that curricula in the summer are better planned and a wider selection of course offerings are available.
3. The split third-term plan provides maximum flexibility for student

participation. Students wishing to continue under the 2-semester academic program may continue to do so, thereby gaining a half semester a year, and yet retaining a 10-week summer vacation from the end of June to the end of August. Mature or highly motivated students, particularly those planning to continue with graduate or professional studies, may graduate in three years by electing an extra half semester for two of three years and then attending a full third term in their final summer.

4. Greater flexibility is offered to the faculty with respect to when and how long they are required to be on campus. Two-term appointees could teach the two terms from August to May, the two terms from early May to Christmas, or the two terms from after New Year's to late August. Faculty members who so desired could augment their income or accumulate credit for additional time off by teaching for one half of the third term while still maintaining a full 11 weeks for research, writing or vacation. No faculty member at Michigan is required to teach more than two terms out of three.

5. The split-third term increases the number of students whom the University of Michigan serves during the summer months, even assuming that all regular students wish to be on campus during the fall and winter. If students were willing to attend in both summer terms and take either the fall or winter term off, then maximum year-round use could be made of the resources of the University. The split-trimester accommodates itself well to either pattern.

6. Nearly forty per cent of institutional costs at Michigan are fixed. If the split-trimester attracts more students to the summer session than attended under the conventional semester system, and the staff-student ratio remains unchanged, university operation becomes more economical per student taught. In fact, during 1968-69 academic year, Michigan's summer operation yielded about $1,690,000 in additional net income compared to what would have been earned under the former semester system.

7. The length of the third-term permits a greater consistency of course structure throughout the year. Courses may be offered at regular speed through the entire third term or may be taught in their entirety in one-half of the third term by being offered on twice as many days of the week or for twice as long on the same days as during the fall and winter.

Disadvantages:

1. This change of calendar, as with any major alteration, disturbs long established course sequences and the total academic rhythm. Courses have to be altered to suit the new time-table.

2. Problems may arise in adjusting faculty salaries to the new academic period and in providing adequate remuneration for teaching in the third term.

3. Teachers and other summer school clients might prefer a 6-week rather than a $7\frac{1}{2}$-week summer term. The latter, however, is probably educationally preferable.

4. Problems may arise in staffing the third term if many regular staff members do not wish to teach during the summer.

5. The administrative burdens will grow. There will be an increased number of registrations and grade reports each year.

6. If faculty do not adequately adjust their courses to the new time periods of the calendar, increased pressure may be placed on students who are forced to learn more in shorter periods of time.

SECTION 3

THE AUSTRALIAN EXPERIENCE

Summary of the Australian Experience

The following comments on year-round teaching in Australia are taken from Report to Australian Vice-Chancellors' Committee on Year-Round Teaching by D. Cochrane, Professor of Economics, Monash University, Victoria.

Comments are frequently made that universities do not use their facilities for as high a proportion of the calendar year as they might. To remedy this situation, the university working week could be extended or the academic year could be increased. Since some departments at Monash already have some regular classes timetabled in the evening, a look at extending the academic year was thought to be more profitable. The basic question under consideration is whether year-round teaching is a viable proposition when considered from both an academic and a financial point of view. Throughout the study, the Faculties of Law and Medicine were omitted.

Summary of the Calendar Alternatives

There are three calendar alternatives for year-round teaching - the semester, the quarter and the trimester systems. Each are characterized as follows:

Semester System

The semester system comprises two semesters plus a short summer term. Although the semester varies in length between universities a typical semester may be put at 17-18 weeks, consisting of 14 or 15 weeks of teaching plus a mid-semester vacation of one or two weeks and a week of examinations. To this period should be added a registration period for students that could occupy up to a week before the start of the semester.

The amount of time left over each calendar year for a third or summer term is therefore relatively short; less than three months in the June to September period. Within this period there is often a summer term which varies considerably in length between universities and indeed between different faculties in the same university. In general the length of the summer term varies from six to ten weeks. This session caters for a great variety of student and non-student interests as well as providing additional income for the academic whose salary has traditionally been paid for working a nine month year. Some units are taught in the summer session for credit in both undergraduate and graduate programmes, but usually these are limited in number and by virtue of the time factor are concentrated in form.

Quarter System

The second main form of calendar pattern is the quarter system. Like the trimester system this method of teaching has expanded in the post-war period partly in an attempt to provide some means of handling the rapid rise in university enrolments. The quarter system divides the calendar year into four equal periods. Each of these periods usually extends over 11 weeks and comprises 10 weeks of teaching plus a week of examinations.

The normal academic year usually comprises the three quarters starting from October in each year. Subjects may be taught over one, two or three quarters. In general subjects are divided into units so that even if they are considered to mature over three quarters there is an examination for the work done in each unit. The fourth quarter, which falls in the June to September period, becomes a summer session and in most cases tends to play a similar role to the short summer term. Staff are expected to teach over three quarters and are paid extra for teaching in the summer quarter.

Trimester System

The semester system has the obvious disadvantage that the summer term is squeezed into a much smaller interval between the two main teaching periods. This disadvantage is overcome in the quarter system, but an alternative, which retains the longer teaching periods of the semester system, is offered by the so-called trimester system. This system divides the calendar year into three equal parts. Since each of these parts is equal to some 17 weeks in length, the year is neatly divided into three semesters of approximately the same duration as the traditional semester.

Appreciating the possibilities provided by such an arrangement a number of universities, including some new ones in Canada, launched into the large scale operation of such a system. Again the third semester fell into the June-September period and became the summer semester.

Advantages

1. Year-round teaching causes increased use of facilities and physical plant.

2. Students who wish may complete a four year course in three years. It also provides a method of taking a missed subject in the next semester rather than taking a whole year to make up failures.

3. Teaching in units instead of by years makes the process of allowing credit for courses taken at other universities easier. There would also be more opportunity for interuniversity exchanges.

4. Staggering the vacation period for students will ease the rush for summer jobs. In the case of engineers, where job training is part of the degree courses, a staggered period of placement will ease the job situation.

5. There will be a more even use of library and study facilities instead of the usual year-end scramble for books.

6. It is possible for the staff to teach four of six semesters, giving them two semesters off in succession for the purpose of research.

7. A staggered graduation will overcome the surplus of graduates on the job market in November. An even release of graduates would give them a better chance at employment. An accelerated programme would also give them one more year's salary and an extra year of experience.

Disadvantages

1. With the use of facilities on a year-round basis, the universities will not be able to rent residence and college facilities for conferences during the summer break.

2. Year-round teaching adds considerably to administrative burdens of registration, updating student records and selection of students for admission.

3. The student will lose time to read, reflect, absorb and mature, and that as a result a dimension will be lost in the quality of the answers given in examinations, that will now come twice or three times annually.

4. If any substantial use is to be made of the university facilities during the summer months, it would be necessary to air-condition most of the facilities.

5. There would need to be an increase in maintenance staff since repairs would have to be kept up year-round instead of during summer break.

6. An increase in staff to accommodate the increase in students would produce an increased need for staff offices and research facilities.

7. With unit teaching and examinations three times a year, there will be a trend towards decentralization. The faculty will advise the student, enrol him in courses, look after his examination results, etc. The central administration will get his complete record after the beginning of term. There will need to be new levels of inter-faculty cooperation and also an increase in administrative personnel.

Conclusions

A few Australian universities have already adopted a "semester" system of teaching. Some departments at Monash and all of Macquarie University operate on a unit scheme. It should be noted that the adoption of a unit scheme does not imply the adoption of year-round teaching. On the other hand, the adoption of the year-round pattern does imply some form of the unit scheme.

The Faculty of Economics and Politics at Monash conducted a survey of second, third and fourth year students in 1968, the first year of the semester unit teaching scheme. The students, who had experienced the traditional arrangement the year before, responded overwhelmingly in favour of the semester system.

A study on the use of residences shows that the costs per student per session would be little affected by year-round operation. The gains from greater use of the facilities are offset by increased costs of repairs and renovations.

As far as the calculations of costs and benefits go, with no increase in student enrolment, the year-round system would cost Monash $1,300,000, a 50% increase in enrolment would produce a net gain of $2,000,000 and, by interpolation, zero social gain would be achieved for a 20% increase in enrolment.

On the basis of the calculations for Monash it seems likely that an increase of at least 15-20% in annual enrolments would be required in most Australian universities to provide the social benefits needed to outweigh the net additional university costs that would arise as a result of teaching over a large academic year. The benefits would be maximized under a unit scheme of teaching. The addition of Law and Medicine into the calculations would be expected to increase the net social benefits.

In his conclusions, Cochrane expresses the desire for uniformity in the calendar year. Sports, conferences and credits from other universities would all be easier to arrange. Some universities would be sensible just to change the length of terms to conform to the year-round pattern and not teach the fourth quarter on third semester at all. In this case, the quarter system would provide minimum change.

Cochrane concludes with the comment that more debate should centre on which system, which university and when, given that year-round teaching is a feasible economic and academic objective.

SECTION 4

ONTARIO UNIVERSITIES - DATA ON PRESENT YEAR-ROUND UTILIZATION

During the early part of this year there were a number of suggestions in the daily press that the universities of Ontario might reap significant economies by utilizing their physical plants for a larger part of the year than they do now. Readers were led to believe that for a large part of the year, as well as for that portion of the day after normal working hours, there is little productive activity in progress in Ontario campuses.

In an attempt to determine the extent to which university facilities are under-utilized and also to obtain some initial impressions of the possible economies resulting from a more intensive use of the universities' physical plant, a survey of all of the major activities that take place on Ontario campuses was undertaken.

It was decided to keep the survey as simple as possible and to estimate the extent to which the level of activity on campus fluctuates during the day and through the year by noting student head-counts apportioned between day (8 a.m. - 5 p.m.) and evening (after 5 p.m.) sessions for each major type of university activity through the entire year. This would give us a rough estimate of the "true" utilization taking all major activities of universities into account. The activities chosen for measurement were as follows:

1. All full and part-time undergraduate and graduate enrolment for credit including special and summer courses.

2. All non-credit courses.

3. All casual bookings excluding dances, sporting events and other student social events.

4. Student residence occupancy rates.

Undergraduate and Graduate Enrolment During the Period September 15 - April 30 (1970-71)

The universities were asked to report the average student head-count apportioned between day, (8 a.m. to 5 p.m.) and evening (after 5 p.m.) sessions during the normal semester year. Of the fourteen provincially assisted universities in Ontario we received data on ten, but we were able to obtain dependable estimates for the undergraduate and graduate enrolments of the missing universities by reference to the 1970-71 UA3 returns. These four latter estimates would represent lower bounds because courses not funded by DUA would be excluded. Our data show that the undergraduate and graduate student head-count on Ontario campuses between the hours of 8 a.m. to 5 p.m. during the period September 15-April 30 was about 118,000 and that the after 5 p.m. student head-count for the same period was about 42,000; evening head-count was about 36% of the day head-count. Thus, far from

being vacant in the evenings, universities are accommodating a substantial demand for evening courses in the few evening hours that are normally provided for such courses.

Undergraduate and Graduate Enrolment During the Period May 1 - September 15 (1970-71)

For summer session enrolments our data cover only ten universities and show that there were a total of about 42,000 undergraduate and graduate students enrolled in these ten Ontario universities. Of these students, about 29,000 were attending undergraduate courses and 13,000 graduate. If we increase these figures on a full-time enrolment pro-rata basis to cover fourteen universities we obtain a figure of about 49,000 undergraduate and graduate summer students, or about 30% of the total peak enrolment. Admittedly, some of these students would be attending courses which extend over only 6, 8 or 10 weeks of the 14 week summer period. Much building maintenance and renovation work has traditionally been shoe-horned into this period, it being the only really convenient time to undertake such work, so the figure of 30% may not be, in fact, uneconomic in overall terms.

Non-Credit Courses

The universities were asked to report the head-count enrolment in each of their non-credit courses each month apportioned between day and evening sessions. We received responses on non-credit courses from eight universities and the results by month are shown in Figure 1. As might be expected most non-credit courses are offered in the evenings. The figures also show that there is little of this type of activity during the summer, a situation which almost certainly reflects the wishes of the students rather than those of the university. Since the data are probably not very accurate our intention here is to display year-round patterns rather than absolute levels of activity. However, the average level of activity after 5 p.m. for the eight months September to April inclusive, is about 10,000 non-credit enrolments each month, the peak enrolment of 13,756 occurring in November. For the summer months, May to August inclusive, the average enrolment is 1,262 non-credit enrolments each month. Between 8 a.m. and 5 p.m. the level of activity in non-credit courses is small and subject to much less variation throughout the year, averaging about 1,200 non-credit enrolments each month. We are dealing with non-comparable data so we could not merge these data with the credit enrolment information but it is obvious that addition of these data would produce significant improvement in the evening courses as a proportion of peak load.

Casual Bookings

The universities were asked to provide us with as much data on casual bookings as possible. These are defined as requests for space of any type originating from faculty, students or non-university sources. Defined as such, the category includes just about every type of activity except student social events and sports events. Examples of events included would be faculty, student and non-university conferences, conventions and meetings, dramatic productions, films and musical concerts, exhibitions, and short-run public clinics and programmes of various types. It was quite obvious from both the definition and the data from the universities that great accuracy would not be possible and the intent here was to illustrate the amount and variety of activities that take place in university space.

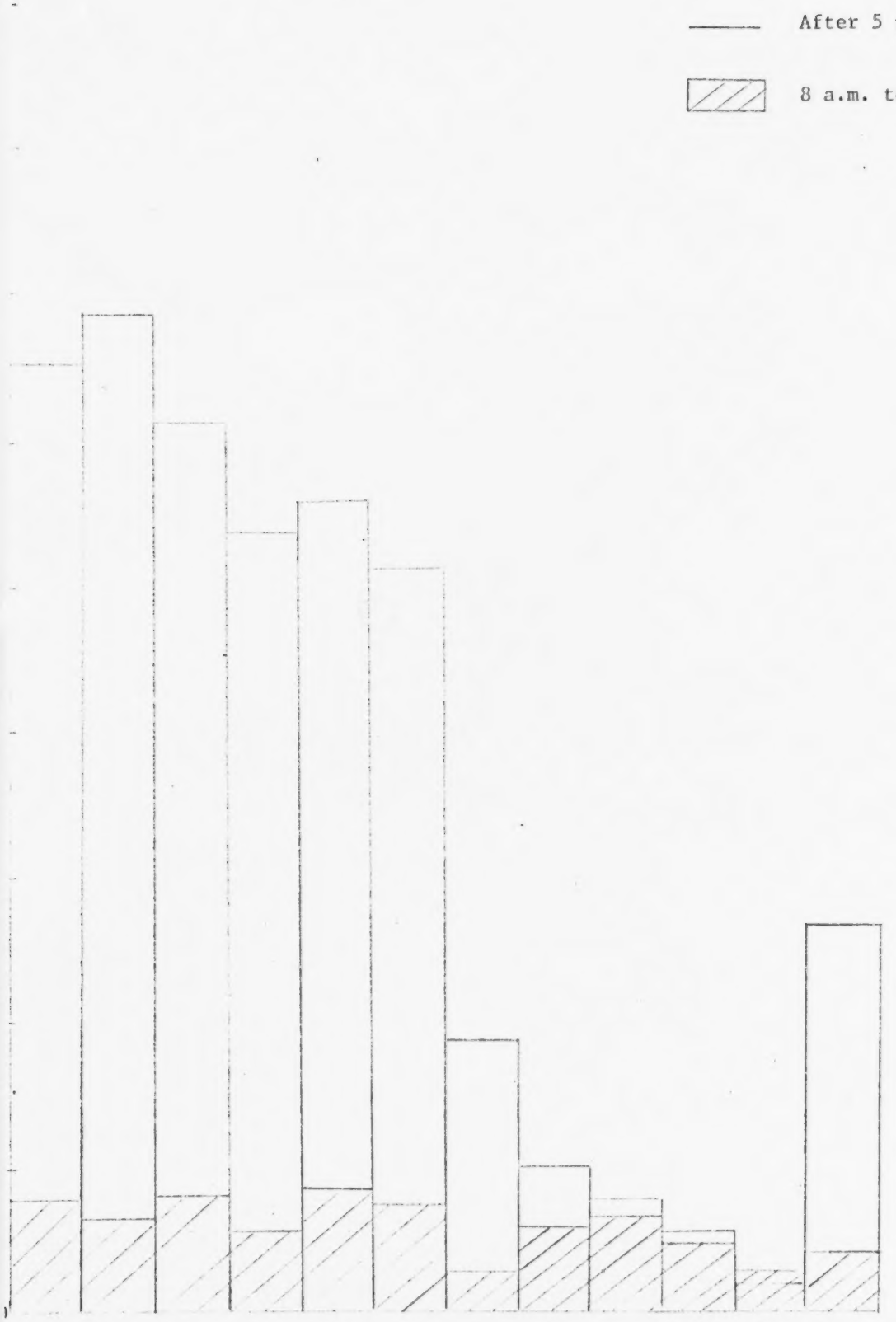
After 5 p.m.
8 a.m. to 5 p.m.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Sept.

FIGURE 1

The results, although not strictly comparable, were merged for the ten universities for which returns are available. Figure 2 shows the yearly pattern of these activities during the day and during the evening. It may be seen that the events taking place between 8 a.m. and 5 p.m. exhibit more limited variation through the year than those after 5 p.m. which show a more pronounced decline during the summer. This is most likely another example of public preference rather than university policy. If it is desired to increase the evening utilization of university space during the summer, a shift in public attitudes would probably have to occur.

Student Residence Occupancy Rates

Information on the use of university residences during the months of May, June, July and August was also requested and supplied by nine universities. Four responded by providing the percentages of total beds occupied during these months. The others provided actual numbers and no percentages so it became necessary to estimate the total number of beds available at each of these institutions using our knowledge of the enrolment at each university. By applying the percentages supplied in the returns to the estimates of total bed capacity and combining the results with the rest of the returns we were able to obtain reasonable estimates of the overall percentage occupancy of Ontario university residences during the summer months. For May, June, July and August the average occupancy rates at the nine universities for which data were available were 38.7%, 42.9%, 42.5% and 37.7% respectively. While there is certainly room for improvement in these figures, when taken together with almost 100% utilization in the other months the annual average would be respectable by any standard.

Having acquired some indication of the daily and yearly "load fluctuations" in the Ontario university system, it would be instructive to examine the kinds and amounts of various types of space in a university in order to determine what kinds of space are candidates for economies through greater utilization and to obtain a "feel" for the potential savings that they offer. Of the total amount of space in the fourteen universities of Ontario some 33% is non-assignable space. 2/ The remaining assignable space may be distributed into seven categories and expressed as percentages of total assignable space as follows.2/

1.	Regularly scheduled space 3/	29.9%
2.	Research space	10.0%
3.	Office space, academic and administrative	18.0%
4.	Library space	10.9%

2/ Source: Taylor, Lieberfeld and Heldman space reports, 1968

3/ Includes lecture, seminar and conference rooms and instructional laboratories as well as audio visual and clinical facilities.

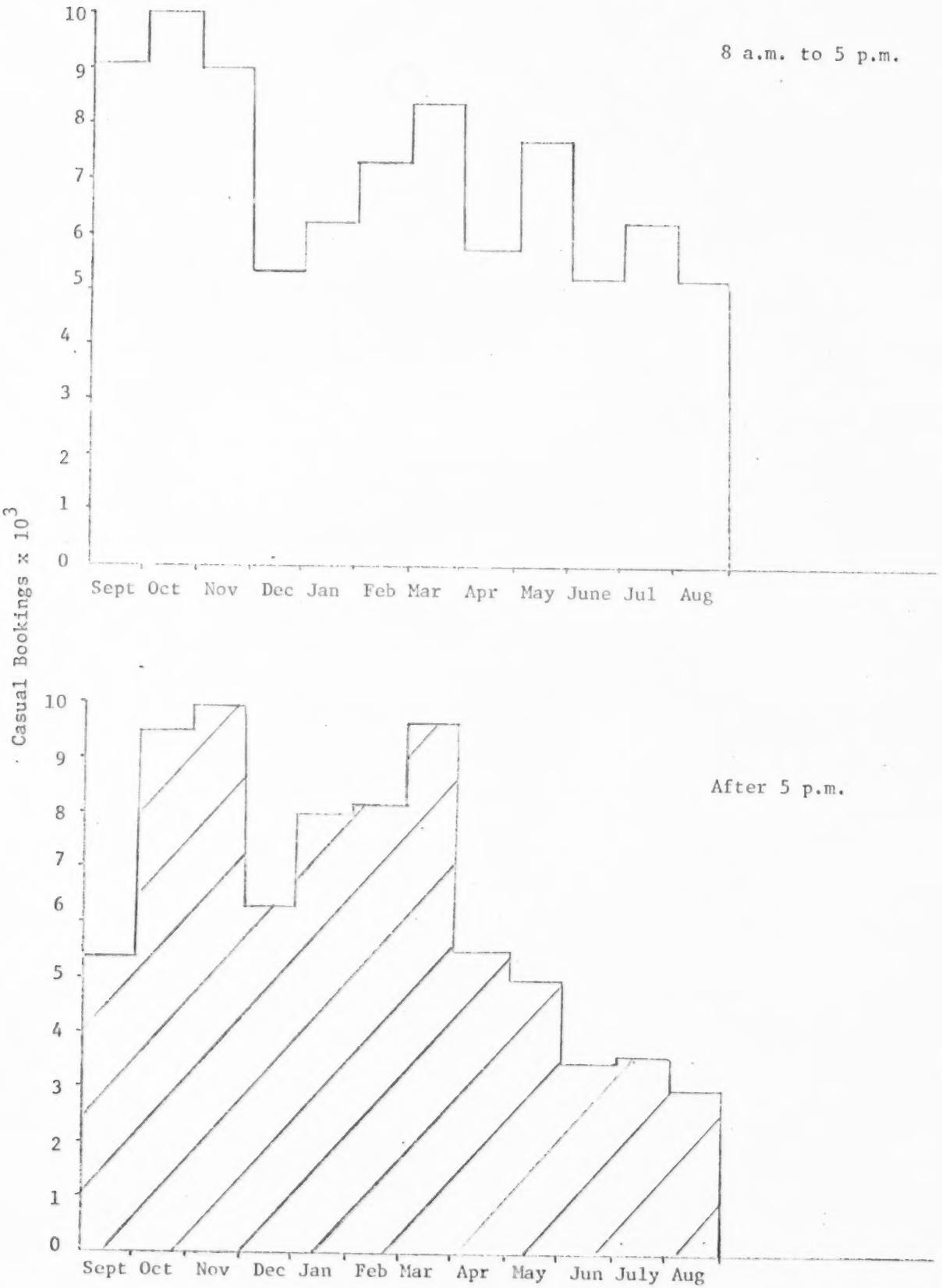
8 a.m. to 5 p.m.
After 5 p.m.
Casual Bookings x 10^3
0
1
2
3
4
5
6
7
8
9
10
Sept Oct Nov Dec Jan Feb Mar Apr May June Jul Aug
Sept Oct Nov Dec Jan Feb Mar Apr May Jun July Aug

FIGURE 2

5.	Food and lounge space	7.5%
6.	Physical education space	6.5%
7.	Physical plant and service space	17.2%

If we exclude those types of space which are obviously not going to yield greater utilization as a result of year-round operation of any kind or of an extension of the working day such as research space, office space, and physical plant and service space, we are left with some 54.8% of the total assignable space. Theoretically it is possible to obtain greater utilization of this 55% of total assignable space if a year-round operation scheme were implemented because the same space would be used for a greater throughput of students. The catch is that university resources such as space, academic staff, library staff, administrative staff, etc. are never used in isolation and in order to utilize those "seemingly" vacant buildings to a greater proportion of capacity during the summer it becomes necessary to supply the other components of the package such as extra academic staff for the extra students, extra service staff for the more heavily used food and lounge space, etc. If we are justified in assuming that staff of any kind will not be persuaded willingly to extend their stipulated hours of labour in the interests of economy without extra and very likely proportionate compensation, then it requires no great imagination to see why it is so difficult to pick up those extra economies promised by partial analysis of one resource component. In point of fact, an attempt to extract greater utilization of existing space will almost certainly require greater labour inputs to the system. It should not be forgotten either that a 10% increase in utilization of regularly scheduled space (which would be a large increase) would only mean a 3% increase in the utilization of total space.

Another consideration that affects mainly scheduled space is that for a university of any size and complexity scheduling conflicts make possible only limited utilization of any given space. If an institution were very efficiently loaded during the day and evening and around the year it would prove quite difficult if not impossible, to handle the vast amounts of other activities that take place in the university environment that are related to community and public service. The extent of such activities is well documented in the university reports. There may be room for improvement in the utilization of space by Ontario universities but the potential improvement is certainly not of the magnitude promised by superficial and ill-considered assessments of the situation, which in our opinion tend to magnify out of proportion cases of underutilization of space without giving much thought to overcoming the many obstacles that prevent greater utilization of space.

SECTION 5

TWO SPECIFIC CANADIAN UNIVERSITY VIEWS ON TRIMESTER SYSTEMS - GUELPH AND MANITOBA

The Manitoba University Study[1/]

The University of Manitoba Report on Year-Round Systems contains descriptions of various options (balanced trimester, semester, Waterloo plan, eleven quarter system), discussion of staffing problems, several examples of staff loading on trimester and quarter year-round systems and presents some cost models for evaluating building and staff costs. The models take into account (1) retention rates in the extra term (2) student flow rates (3) staffing patterns and staff operating costs (4) space costs per student (5) costs of staff offices and research space and (6) carrying costs of capital expenditures. After having taken all these into account members of the committee submitting this report came to these conclusions:

1. Year-round systems provide for improved utilization of buildings. The amortized annual cost of buildings varies from $1,860 per admission per year for the standard two-term calendar to $1,210 for the most efficient year-round system. Equivalent per student costs are respectively $650 and $425 for the two-term and the most efficient of the year-round systems studied. The maximum possible savings in building costs are therefore of the order of $225 per student per year, or $2,900,000 per year, for a total enrolment of 13,000 students.

2. Staff costs in general, are likely to be very much greater for year-round systems than for the standard two-term systems. Staff costs fall into two categories (a) and (b) discussed in the following paragraphs.

   (a) It has been noted that if a set of buildings [is] used the year-round, building costs per students can be reduced. In the same way, if we could use the same staff the year-round, staffing costs could be similarly reduced, if we disregard for the moment, the increased staff associated with the necessity of 'opening' an increased number of class sections in switching from a two-term to a year-round calendar.

   But it is unlikely that staff accustomed each year to several months free of teaching duties, will accept year-round teaching assignments. Thus, in a year-round system, although we can utilize the buildings, we cannot utilize for teaching duties, the staff on a twelve-month basis. This means, that for a twelve-month operation, some system of staffing must be devised which will demand only 8 or 9 months of teaching from each member of staff. Such a system is extremely difficult to devise, and such systems which meet the requirements of different terms off

1/ University of Manitoba, Committee on Academic Year, Report on Year-Round Systems, 1970.

in different years, and ease of planning staff assignments prove to be considerably more costly than two-term systems. Thus in most year-round systems, staff costs are generally greater and are inherent in the particular staffing system adopted.

Staff costs inherent in the system, vary from $2,290 per admission per year for the two-term system, to $2,720 for the systems studied. Per students' costs per year are $800 for the two-term to $950 for the most costly year-round system. For an enrolment of 13,000 students, the increase in staff costs inherent in the system could be as high as $1,900,000.

(b) At Manitoba, out of 1,463 courses offered, only 171 are sectioned. If we were to change from a two-term system to a year-round system employing three streams, it would be necessary to open 1292 x 2 = 2,584 additional sections, at an estimated cost of $14,000,000 per year. These costs, which are related to the necessity of increasing the number of sections in a year-round system, when added to the increased staff costs inherent in year-round systems, are of the order of three to six times the savings that might be expected from increased building utilization. These figures point to only one conclusion: No reduction in costs can be achieved by the introduction of year-round operation at Manitoba.

OFFICE OF THE PRESIDENT

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APR 14 RECD

April 13, 1971

Mr. B. L. Hansen,
Director of C.P.U.O. Research Division,
230 Bloor Street West,
Toronto 181, Ontario

Dear Mr. Hansen:

As you requested in your letter of March 22, we have prepared some comments on year round operation of a university which I hope you will find helpful.

First, a general comment. The conventional wisdom is that while operating costs go up due to the operation of a third semester this is more than offset by the increased use of the physical plant facilities. This is an over simplified view, however, since only a portion of the facilities, namely, classrooms and teaching laboratories, and presumably libraries receive increased use. Furthermore, classrooms and teaching laboratories account for twenty per cent, or less, of the total assignable space at a university. Nor should the fact be overlooked that due to the added staff required to carry a three semester load additional capital costs are incurred. The obvious example of this is faculty offices, since an office must be provided for each faculty member whose normal teaching load is two semesters out of three. Thus if there is a 50% increase in faculty (i.e. there is an equal enrolment for all three semesters) then 50% more office space must be provided. Also, there probably is an increase in faculty research space and in administrative office space. These added capital costs must be taken into account when attempting any balance of benefits and costs.

Clearly, if a true social accounting is to be engaged in, one would have to take into account the total cost in both capital and operating expenses required to produce various types of graduates and the contributions to the economy produced by such graduates and the earnings foregone by them during their period as students.

The following detailed comments might be made in favour of a three semester system.

1. Students can enter the University three times a year (September, January and April) thus providing more university places for the Province.

2. The three-semester system allows in-course students to accelerate, decelerate, or to proceed at the normal pace of two semesters each calendar year.

3. Greater flexibility is permitted the faculty in the use of their research time. Periods other than the summer months may be used for these purposes.

4. The operation of a third semester appears to meet a demand since in the Guelph experience the number of continuing students re-registering has increased from 17% of those eligible in Spring 1966 to 30% in Spring 1967, and 45% in Spring 1968 (53% in Arts and 27% in Science). During the same period the number of freshmen registering in the Spring semester has increased each year. The total undergraduate enrolment in the Spring semester has increased from 308 students in 1966 to 618 students in 1967, 1,197 in 1968, 1,603 in 1969 and 1,828 in 1970.

The following comments might be made regarding the disadvantages of such a system.

1. Increased costs per student course hour are incurred during the third semester due to the lower student-faculty ratio in this semester. This lower student-faculty ratio arises from the relatively small enrolment in the third semester combined with necessity of offering a certain basic number of courses to maintain the quality of the programme in the third semester. If the third semester becomes fully accepted then this added cost will diminish to zero as the enrolment becomes equal in all three semesters, or attains a certain minimum number for all three.

2. Added administrative costs are incurred due to:

   -- three full admission, registration and examination processes during the calendar year.

   -- three full fee calculations and collection processes.

   -- greater volume in all data collection and information systems increasing clerical and computer programming and hardware costs.

   -- greater use of physical resources resulting in greater housekeeping and maintenance costs.

   -- lack of normal university slack periods to provide staff holidays, and the added planning and programming in both administrative and academic departments, create other pressures for increased staff and increased professional support to senior administrators.

... 3

It is not clear, however, whether adding these additional costs to the cost of a regular two semester operation leads to a higher or lower administrative cost per student course hour when averaged over the three semester. This will be the subject of further study at Guelph.

Finally, there are some particular problems with regard to B.I.U. reporting under the Ontario system of financing.

The present enrolment reporting system is biased against a three semester university when compared to other Ontario Universities operating on a regular two term system. The bias occurs in the following ways:

1. Universities on a regular two term system report undergraduate enrolment once only at December 1. They receive full annual payment for all students enrolled at that date. The University of Guelph reports undergraduate enrolment three times per year and therefore is required to recount the students who were enrolled at December 1. The recount occurring during the Winter semester eliminates from our entitlement students who have withdrawn after December 1. The University of Guelph thus receives 50% of the annual grant for students who have registered in the Fall but have withdrawn after December 1, while other universities receive 100% of the grant for such students.

2. The reporting dates for undergraduate enrolment under the three semester system come after two-thirds of each semester is completed whereas for normal two term universities, it comes after one-third of the reporting period is completed. The relative number of drop-outs will be larger at the University of Guelph because of this arrangement, producing a relatively lower B.I.U. than at other universities.

These objections might not be valid if a university operated all its programmes on a three semester basis. However, in the case of Guelph, which operates some programs on a three semester system and some on a two semester system, some hardship is encountered.

For example, for the year 1970-71, the requirement to report both Fall and Winter semester enrolments separately, for two semester programmes lead to a B.I.U. entitlement which was 113 less than that which would have been earned by another University operating the same programmes and reporting only on December 1. This represents a loss of income in excess of $185,000.

Yours sincerely,

W. C. Winegard

W. C. Winegard,
President

SECTION 6

MODEL ANALYSIS OF THREE MAJOR UNIVERSITY CALENDAR ALTERNATIVES

SEMESTER, TRIMESTER AND QUARTER SYSTEMS

M. T. DaSilva

The main reason usually advanced for year-round university operation of any type is that greater efficiency in the use of physical plant will be obtained. Thus, for a given quantity of physical plant more students could be accommodated under a year-round operation than under the conventional semester system. Alternatively to accommodate a given number of students less physical plant would be required with year-round operation than with a conventional semester system.

The purpose of this paper is to describe a few simple year-round teaching models, perform an approximate cost-benefit analysis on each model and offer some discussion of the likely impact of each model on other areas of the university such as the library and administration.

Although North American universities define and operate their academic years in very different ways, their academic calendars may be loosely grouped into three common "systems" as follows:

Semester System

This consists of two semesters of about 17-18 weeks each (including 14 or 15 weeks of effective teaching) plus a summer term that may vary in length from 6 to 10 weeks. In fact, there is a great deal of variation between universities and even faculties of the same university in the type of summer session offered and generally both credit and non-credit courses are offered. Some universities may even have several distinct summer sessions running concurrently and consecutively. Semester systems were in use in 72% of over 2000 American institutions surveyed in 1968-69.

Quarter System

The quarter system divides the calendar year into four equal periods of 11 or 12 weeks each. The normal academic year comprises the three quarters starting in late September of each year while the fourth quarter becomes a summar session and tends to revert to the role of the semester summer session. This system was in use in about 20% of over 2000 American institutions surveyed in 1968-69.

Trimester System

In this system the calendar year is divided into three equal parts with each 17 weeks in length. This system has the advantage of retaining the longer instructional period of the semester without the disadvantage of a short summer session and as of 1968-69 were in use in about 4% of 2000 American universities surveyed.

In order to compare alternative systems we shall use "throughput" as one criterion. This is defined as the rate at which students are either admitted to or graduated from the system under steady state conditions, all other variables being held constant.

To illustrate this criterion we shall apply this definition to idealized models of the three main systems and derive measures of their "throughput". In order to obtain a valid comparison of alternative systems we must ensure that identical retention rates are used in all cases. This poses a problem because while both the 4-year semester and trimester systems give rise to a total of eight terms, the 4-year quarter system results in a total of 12. Somehow we have to ensure that the retention rates are comparable before comparing systems. We have approximated this condition by ensuring that these retention rates for the first and last terms in each year of each system are identical. This is illustrated in Figure 1 where the fractions in the "semester" column are to be interpreted as follows.

The first number represents the fraction of the initial student intake remaining at the end of term 1 of year 1, the second number the fraction remaining at the end of term 2 of year 1, the third number the fraction remaining at the end of term 1 of year 2 and so on for eight terms in the cases of semester and trimester systems and 12 terms in that of quarter systems.

Figure 2 illustrates the concept of throughput for a 4 year college operating on a semester system. In year 1, term 1, 1000 students are enrolled in the institution but only 900 proceed to term 2. At the beginning of the first term of the second year 740 are enrolled and during the second term the number of enrolled students has dropped to 700. Meanwhile, another 1000 students are enrolled during the first term of the second year and suffer the same attrition as their predecessors at the end of the term so that 900 freshmen are enrolled in term 2 of year 1. This process continues until year 4 in which there are a total 3020 students enrolled in the first term and 2850 in the second.

If we define a ratio R as the maximum enrolment at equilibrium divided by the number of admissions/year we have $R = 3020/1000 = 3.02$. The maximum enrolment is directly related to the demand on the physical plant of the institution while the number of admissions/year measures the extent to which the institution accommodates students; thus, by the maximum utilization criterion, we would like a value of R as low as possible.

It is interesting to note that if the conventional semester operation were employed with student intakes twice a year instead of once, the maximum total enrolment would increase to 5870 in each term while the number of admissions/year doubled to 2000 yielding $R = 5870/2000 = 2.94$.

ASSUMED RETENTION RATES FOR THE THREE TYPES OF 4-YEAR SYSTEMS

Year	Semester		Trimester		Quarter	
	At End of Term		At End of Term		At End of Term	
1	1	0.90	1	0.90	1	0.90
	2	0.74	2	0.74	2	0.85
					3	0.74
2	1	0.70	1	0.70	1	0.70
	2	0.66	2	0.66	2	0.68
					3	0.66
3	1	0.64	1	0.64	1	0.64
	2	0.62	2	0.62	2	0.63
					3	0.62
4	1	0.61	1	0.61	1	0.61
(Graduations)	2	0.60	2	0.60	2	0.61
					3	0.60

FIGURE 1

ILLUSTRATION OF THE CONCEPT OF "THROUGHPUT" FOR A CONVENTIONAL 4 YEAR SEMESTER SYSTEM AFTER STEADY STATE CONDITIONS HAVE BEEN REALIZED

	Year 1		Year 2		Year 3		Year 4	
	Term		Term		Term		Term	
Class	1	2	1	2	1	2	1	2
Freshman	1000	900	1000	900	1000	900	1000	900
Sophomore			740	700	740	700	740	700
Junior					660	640	660	640
Senior							620	610
Total Enrolment at Equilibrium							3020	2850

FIGURE 2

However, the small improvement is a result of enrolment attrition between the first and second terms of each year rather than of any inherently greater efficiency in the latter system. For instance, if we had assumed that all attrition took place at the end of the year rather than between terms then the total maximum enrolment would have doubled while the number of admissions/year would have also doubled giving R = 3.02.

If we apply the same analysis to a four year balanced trimester system (three intakes/year) assuming the same retention rates, we have the situation shown in Figure 3 at equilibrium. In the first term of the first year 1000 students enter and 900 of these progress to the second term at which time another 1000 students enter. By term 3 of year 1 the group of students that entered in term 1 are on vacation, the second group now numbering 900 are in their second term of attendance and a third group of 1000 has just entered.

By term 1 of year 2, the first group has returned from vacation and now numbers 740, the second group is on vacation, the third group has been reduced to 900 and are in their second term of attendance while a fourth group of 1000 students enter. This process continues until the situation shown in year 5 of Figure 3 occurs. In this case the maximum enrolment totals 5870 in each term while the number of admissions/year is tripled to 3000. Therefore R = 5870/3000 = 1.96.

For a four year quarter system with comparable retention rates we have the situation shown in Figure 4 where R = 8640/4000 = 2.16.

In terms of the relative throughput efficiencies of these three systems the trimester system is 54% more efficient than the typical semester and the quarter system is almost 40% more efficient. Also, if there were no attrition at all in the university the trimester system would be exactly 50% more efficient than the semester system and the quarter system exactly 33 1/3% more efficient. These latter represent the lower boundaries of the relative efficiencies of the three systems and as the student attrition rate rises the differences between the efficiences of trimester and quarter systems and the typical semester system increase.

The foregoing computations are theoretical to the extent that a balanced intake of students is assumed whenever there is more than one intake per year. In practice this assumption rarely holds. To investigate the effect of an inbalance in the student intake we shall assume that the freshman intakes shown in Figure 5 occur. These assumed student intakes have not been idly chosen. Assumption A corresponds roughly to the actual conditions initially experienced by institutions which have switched from the typical semester system to a trimester or quarter system while Assumption B represents the kinds of target enrolments such institutions regard as feasible after several years of operational experience and student proselytizing. For example, the Berkeley campus of UCLA has been operating on a quarter system for several years and has recently expressed the hope that the summer term enrolment which has been rising slowly will eventually

ILLUSTRATION OF A BALANCED TRIMESTER SYSTEM AFTER STEADY STATE CONDITIONS HAVE BEEN ATTAINED

	Year 1			Year 2			Year 3			Year 4			Year 5		
		Term			Term			Term			Term			Term	
Class	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
	1000	900		1000	900		1000	900		1000	900		1000	900	
Freshman		1000	900		1000	900		1000	900		1000	900		1000	900
			1000	900		1000	900		1000	900		1000	900		1000
				740	700		740	700		740	700		740	700	
Sophomore					740	700		740	700		740	700		740	700
						740	700		740	700		740	700		740
							660	640		660	640		660	640	
Junior								660	640		660	640		660	640
									660	640		660	640		660
										620	610		620	610	
Senior											620	610		620	610
												620	610		620
													5870	5870	5870

FIGURE 3

ILLUSTRATION OF A BALANCED QUARTER SYSTEM AFTER STEADY STATE CONDITIONS HAVE BEEN ATTAINED

	Year 1				Year 2				Year 3				Year 4				Year 5			
	Term				Term				Term				Term				Term			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	1000	900	850		1000	900	850		1000	900	850		1000	900	850		1000	900	850	
Freshman		1000	900	850		1000	900	850		1000	900	850		1000	900	850		1000	900	850
			1000	900	850		1000	900	850		1000	900	850		1000	900	850		1000	900
				1000	900	850		1000	900	850		1000	900	850		1000	900	850		1000
					740	700	680		740	700	680		740	700	680		740	700	680	
Sophmore						740	700	680		740	700	680		740	700	680		740	700	680
							740	700	680		740	700	680		740	700	680		740	700
								740	700	680		740	700	680		740	700	680		740
									660	640	630		660	640	630		660	640	630	
Junior										660	640	630		660	640	630		660	640	630
											660	640	630		660	640	630		660	640
												660	640	630		660	640	630		660
													620	610	610		620	610	610	
Senior														620	610	610		620	610	610
															620	610	610		620	610
																620	610	610		620
																	8640	8640	8640	8640

FIGURE 4

STUDENT INTAKE ASSUMPTIONS FOR THE
TRIMESTER AND QUARTER SYSTEM

	Trimester		Quarter	
	Assumption A	Assumption B	Assumption A	Assumption B
First Term	1000	1000	1000	1000
Second Term	700	900	700	900
Third Term	200	400	700	900
Fourth Term	N/R	N/R	200	400

FIGURE 5

stabilize at about 40% of the fall term enrolment. Under these assumptions and given that the same retention rates hold, the relative efficiencies of the five alternatives are shown in Figure 6. It may be seen that the greater efficiency of the trimester over the typical semester system drops from 54% to 16% under Assumption A and to 25% under Assumption B. Similarly, the greater efficiency of the quarter system over the semester system drops from 40% to 14% under Assumption A and to 20% under Assumption B.

Thus, although the theoretical increases in efficiency under balanced intake conditions are very attractive, any significant inbalances in student intake produce large losses in planned increases in efficiency.

The foregoing analysis has been restricted to the problem of extracting as much use as possible from the physical plant of an institution. Unfortunately, the academic calendar adopted is not independent of other university considerations such as academic staffing and the operation of libraries and central administrations. Indeed much, if not all of the savings that are theoretically possible by restructuring the operating year may be required to provide the extra staff made necessary by the new system.

In what follows, we shall investigate various staffing schemes for both the trimester and quarterly systems and evaluate alternative staffing schemes in the light of the following 'ideal' criteria.

1. Staff ought not be asked or permitted to teach more than two of three terms per year in a trimester system or three out of four in a quarter system if the traditional time off under the two term system is to be retained.

2. For each staff member, the term during which he is off should not occur in the same term in successive years. Thus, the system should provide automatic rotation of the term off in successive years.

3. The system should be economical on staffing costs.

Figure 7 shows several staffing plans for balanced trimester and quarter systems.

Plan 1 shows a staffing arrangement for a balanced trimester system in which each staff member alternately teaches for two consecutive trimesters followed by one trimester off. The efficiency of this arrangement (defined as the number of staff 'on' in the term of maximum enrolment divided by the total number of staff) is 67%. This plan meets criterion #1 above but fails to meet criteria #2 and #3. (An efficiency of 75% or higher is deemed acceptable.) It should be noted that any attempt to change 'off' periods in this scheme must result in at least one professor having to teach 3 trimesters consecutively.

COMPARISON OF TRIMESTER AND QUARTER SYSTEMS WITH UNBALANCED INTAKES UNDER STEADY STATE CONDITIONS

	Semester		Trimester						Quarter							
			Assumption A			Assumtpion B			Assumption A				Assumption B			
Term / Class	1	2	1	2	3	1	2	3	1	2	3	4	1	2	3	4
Freshman	1000	900	1000	900		1000	900		1000	900	850		1000	900	850	
				700	630		900	810		700	630	595		900	810	765
			180		200	360		400	595		700	630	765		900	810
									180	170		200	360	340		400
Sophomore	740	700	740	700		740	700		740	700	680		740	700	680	
				518	490		666	630		518	490	476		666	630	612
			140		148	280		296	476		518	490	612		666	630
									140	136		148	280	272		296
Junior	660	640	660	640		660	640		660	640	630		660	640	630	
				462	448		594	576		462	448	441		594	576	567
			128		132	256		264	441		462	448	567		594	576
									128	126		132	256	252		264
Senior	620	610	620	610		620	610		620	610	610		620	610	610	
				434	427		558	549		434	427	427		558	549	549
			122		124	244		248	427		434	427	549		558	549
									122	122		124	244	244		248
Total Enrolment at Equilibrium	3020	2850	3590	4964	2599	4160	5568	3773	5529	5518	6879	4538	6653	6676	8053	6266

$R = \frac{3020}{1000} = 3.02$ $R = \frac{4964}{1900} = 2.61$ $R = \frac{5568}{2300} = 2.42$ $R = \frac{6879}{2600} = 2.65$ $R = \frac{8053}{3200} = 2.52$

FIGURE 6

SOME BALANCED TRIMESTER AND QUARTER STAFFING PLANS

0 = 'off'

	YEAR 1			YEAR 2			YEAR 3			YEAR 4			
Professor	1	2	3	1	2	3	1	2	3	1	2	3	
A			0			0			0			0	
B		0			0			0			0		PLAN 1
C	0			0			0			0			E = 67%
'ON'	2	2	2	2	2	2	2	2	2	2	2	2	
A				0				0				0	
B			0				0				0		
C		0				0				0			PLAN 2
D	0				0				0				E = 75%
'ON'	3	3	3	3	3	3	3	3	3	3	3	3	

	YEAR 1				YEAR 2				YEAR 3				
Professor	1	2	3	4	1	2	3	4	1	2	3	4	
A				0			0				0		
B			0			0				0			PLAN 3
C		0				0				0			E = 75%
D	0				0				0				
	3	3	3	3	3	3	3	3	3	3	3	3	
A			0			0			0			0	
B		0			0			0			0		PLAN 4
C	0			0			0			0			E = 67%
'ON'	2	2	2	2	2	2	2	2	2	2	2	2	

Fig. 7

Plan 2 results in each staff member alternately teaching 3 trimesters consecutively followed by 1 trimester off. The efficiency of this arrangement is 75% and the 'off' period for a professor is automatically advanced. Thus, this plan meets criteria #2 and #3 but fails to meet criterion #1.

Plans 3 and 4 are similar balanced staffing patterns for a quarter system. Plan 3 meets criteria #1 and #3 but fails to meet criterion #2 while Plan 4 meets criterion #2 but not #1 and #3.

However, as has already been pointed out, the experience of other institutions suggests that a balanced system, whether trimester or quarter, is almost impossible to attain. In Figure 8 we show two simple unbalanced trimester and quarter systems on the assumption that the staffing required in the summer term is 50% of that in the other terms. It may be seen that although the efficiencies of these two patterns are fairly high, it has been achieved by abandoning criterion #2 entirely i.e., each staff member is 'off' in the same period every year and any attempt to change this results in 3 or 4 terms of continuous teaching.

Any attempt to design a simple staffing plan that meets the three criteria suggested above which also results in a given desired unbalanced pattern of staff will demonstrate all too clearly the almost insurmountable difficulties involved. In addition, there are other considerations which may be involved such as the necessity of offering certain basic courses every term (comparable accessibility to courses in all terms) and the fact that as the number of professors in the basic or minimum pattern of courses increases small departments may find it financially difficult to acquire necessary staff.

We are now able to derive two of the important costs involved in this comparative analysis i.e., (1) the cost of academic staff per admission/year and (2) the cost of buildings per admission/year.

The cost of academic staff per admission/year

We have already determined that

$$R = \frac{\text{Maximum term enrolment}}{\text{No. of admissions/year}} = \frac{N}{A}$$

and

$$E = \frac{\text{No. of staff 'on' in the term of maximum enrolment}}{\text{Total number of staff}} = \frac{s}{S}$$

If

$$W = \text{Student/staff ratio} = \frac{\text{maximum term enrolment}}{\text{No. of staff 'on' during the term}} = \frac{N}{s}$$

then

$$S = \frac{N}{EW}$$

SOME UNBALANCED TRIMESTER AND QUARTER STAFFING PLANS

0 = 'off'

	YEAR 1			YEAR 2			YEAR 3					
Professor	1	2	3	1	2	3	1	2	3	1	2	3
A,B,C,			0			0			0			0
D		0			0			0			0	
E	0			0			0			0		
'ON'	4	4	2	4	4	2	4	4	2	4	4	2

PLAN 5
E = 80%

	YEAR 1				YEAR 2				YEAR 3			
Professor	1	2	3	4	1	2	3	4	1	2	3	4
A,B,C,D,				0				0				0
E			0				0				0	
F		0				0				0		
G	0				0				0			
'ON'	6	6	6	3	6	6	6	3	6	6	6	3

PLAN 6
E = 86%

Fig. 8

Therefore,

$$\text{Total number of staff/admission/year} = \frac{N}{EWA} = \frac{R}{EW}$$

Let

G be the average annual staff salary (assumed at $13,000)

Then,

$$\text{The cost of staff/admission/year} = \frac{GR}{EW}$$

The cost of buildings/admission/year

To derive a formula for estimating this cost we take into account the total space required/student and the office and research space required/staff member.

Let

$$B = \frac{\text{the cost of building}}{\text{student place}}$$

and

$$D = \frac{\text{the cost of office and research space}}{\text{staff member}}$$

If

$$F = \text{the cost of buildings per student excluding the cost of office and research space}$$

$$F = B-(\frac{D}{W})$$

Let

p = % of the capital cost that yields the annual amortized cost of building.

Since maximum term enrolment/admission/year = N/A = R the cost of the buildings/admission/year (excluding staff office and research space) = RF.

But

$$\text{the total number of staff/admission/year} = \frac{R}{EW}$$

Therefore

$$\text{cost of offices and research space} = \frac{RD}{EW}$$

Therefore

$$\text{capital cost of buildings} = RF + \frac{RD}{EW}$$

Therefore

$$\text{annual cost of buildings per admission/year} = [R(B-D/W)+\frac{RD}{EW}] \quad p$$

$$= \frac{pR}{W} \quad [BW-D+\frac{D}{E}]$$

We shall estimate p = 11% consisting of current interest on bonds of 8% per annum and maintenance at 3% per annum.

We shall use the CAUT figure of $7,000/student cited in the Manitoba study for B and $8,000/staff member for D consisting of

180 gross sq. ft. (120 net) of office space @ $20/sq. ft.	=	$3,600
400 gross sq. ft. of research space for 25% of the staff @ $40/sq. ft.	=	$4,000
$2000 worth of equipment for 25% of the staff	=	$ 500
		$8,100

If we use these formulas to evaluate the trimester and quarter systems in conjunction with some of the likelier staffing plans we obtain the results shown in Figure 8 for balanced systems and in Figure 9 for unbalanced systems. It should be noted that the formulas are only approximations for unbalanced systems since the student/staff ratio is only approximately equal to the maximum term enrolment divided by the number of staff 'on' during the term. Figures 8 and 9 show how dramatically the expected savings decrease with increasing inbalances in intakes in spite of the fact that very efficient staffing patterns have been assumed (E = .80 and .86). In particular, if Assumption A holds the savings/admission/year drops from $841 to $80 for a trimester system and from $747 to $218 for a quarter system. If the more optimistic Assumption B is used, the savings/admission/year drops from $841 to $433 for a trimester system and from $747 to $443 for a quarter system. It can be seen that even under optimistic conditions at least half of the expected savings may be lost.

There is still one aspect of the problem that we have not yet discussed i.e., the necessity of offering each course in each term of the trimester and quarter systems. For any course which is divided into three or more sections in a typical 2-semester system there is no problem but for those courses with less than three sections additional sections will have to be opened. The only figure that we have available on the costs of opening additional sections comes from the University of Manitoba. According to their estimates each section of 2584 additional sections that would have to be opened if that institution were to switch to a trimester system would cost about $5400. Although we consider this estimate to be high, it can be seen that even if the figure were of the order of $2000 to $3000 per additional section and about 2000 additional sections were required in order to switch to a different system (for a university of about 10,000 students) about 4 to 6 millions of dollars would have to be expended on additional staff to provide the extra sections.

TOTAL ANNUAL COSTS OF BUILDINGS AND STAFF/ADMISSION/YEAR

(1) Calendar System	(2) Staffing Plan	(3) R	(4) E	(5) $(\frac{pR}{W}[WB-D+\frac{D}{E}])$	(6) $(\frac{GR}{EW})$	(7) (5)+(6)	(8) Savings per admission/year over 2-term system	(9) Savings per student/year
2-term	normal	3.02	1.00	2330	2454	4784	-	-
Balanced Trimester	#1	1.96	0.67	1566	2377	3943	841	278
Balanced Trimester	#2	1.96	0.75	1548	2123	3671	1113	369
Balanced Quarter	#3	2.16	0.75	1697	2340	4037	747	247
Balanced Quarter	#4	2.16	0.67	1717	2619	4336	448	148

W = 16 = student/staff ratio

B = $7,000 = cost of building/student

D = $8,000 = cost of staff offices and research space/staff member

p = 11% = annual rate for amortizing capital costs

G = $13,000 = average annual new staff salary

Annual cost of buildings/admission/year = $\frac{pR}{W}[WB - D + \frac{D}{E}]$

Annual cost of staff/admission/year = $\frac{GR}{EW}$

FIGURE 8

TOTAL ANNUAL COST OF BUILDINGS AND STAFF/ADMISSION/YEAR

(1) Calendar System	(2) Staffing Plan	(3) R	(4) E	(5) $(\frac{pR}{W}[WB-D+\frac{D}{E}])$	(6) $(\frac{GR}{EW})$	(7) (5)+(6)	(8) Savings per admission/year over 2-term system	(9) Savings per student/year
2-term	normal	3.02	1.00	2330	2454	4784	-	-
Unbalanced Trimester	#5 Assumption A	2.61	.80	2052	2652	4704	80	26
Unbalanced Trimester	#5 Assumption B	2.42	.80	1892	2459	4351	433	143
Unbalanced Quarter	#6 Assumption A	2.65	.86	2062	2504	4566	218	72
Unbalanced Quarter	#6 Assumption B	2.52	.86	1965	2381	4341	443	147

W = 16 = student/staff ratio

B = $7,000 = cost of buildings/student

D = $8,000 = cost of staff offices and research space/staff member

p = 11% = annual rate for amortizing capital costs

G = $13,000 = average annual new staff salary

Annual cost of buildings/admission/year = $\frac{pR}{W}[WB - D + \frac{D}{E}]$

Annual cost of staff/admission/year = $\frac{GR}{EW}$

FIGURE 9

The maximum savings offered (under balanced conditions) by a trimester system for a university of 10,000 students is $3.7 million and for a quarter system, $2.5 million. But, as we have demonstrated above, a far more realistic estimate assuming some degree of inbalance (Assumption B) suggests that the possible savings for a 10,000 student institution in switching from a typical 2-semester system to trimester and quarter systems are of the order of $1.4 to $1.5 million. Considered against the necessity of opening one or two thousand new sections at 2 or 3 thousand dollars/section the expected savings soon turn into losses. In addition there is almost inevitably going to be some increases in library and central administration costs. It is therefore not surprising then that so many of the early expectations associated with year-round operations were not realized.

END

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